ARIZONA TRANSPORTATION RESEARCH CENTER

RESEARCH NOTES:

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ENHANCING ADOT'S TRAFFIC DATA RESOURCE

Arizona experiences growth that is impacting transportation infrastructure and leading to problems of congestion. To mitigate these impacts ADOT and other jurisdictions rely upon traffic data to respond to increases in traffic and plan future improvements. Many groups within ADOT, as well as other public and private organizations in the state, require such data.

Much data is currently collected throughout the state and it is desirable to coordinate activities to reduce redundancies, in crease data consistency, and leverage the benefits of the large amounts of current and future data that must be maintained. Agencies, such as ADOT, have been prompted to more closely investigate the use and sharing of data as the demand for such data increases and funding availability for data collection diminishes.

In order to meet the growing demand for traffic data to assess and monitor operational and capital improvements, many states have begun or are planning to implement centralized traffic data systems. Timely access to accurate and up-to-date traffic-related information and the ability to report, communicate and share this information is an important aspect of ADOT's business and is vital, if the optimal use of resources is to be achieved.

Purpose

This study was undertaken to assess and inventory ADOT's traffic data needs, review current practices, identify statewide sources of traffic data, review ADOT's forecasting methods and other analyses, and review and evaluate the technologies used by ADOT to process, store, manage, and disseminate disparate traffic data across the agency

Based upon the results of the research and review, this study aimed at identifying issues and impediments to efficiently collecting, managing and providing access to ADOT's vast traffic data resources. This study makes recommendations for addressing these issues and develops an implementation plan with the objectives of bringing together disparate working groups within ADOT, establishing consistent standards and procedures, and the phased development of information solutions to integrate, manage, and disseminate accurate and consistent traffic data across the agency and the state.

Background

ADOT is faced with increasing responsibilities for planning, constructing, and maintaining an efficient and safe statewide transportation system. The success of this endeavor relies upon accurate and consistent traffic data. At the same time, ADOT's staffing and financial resources to support traffic data collection, management, and reporting have been cut back substantially.

Accurate and reliable traffic data are essential to a wide variety of transportation applications, including highway, pavement and bridge design and operational analysis. Other important applications are performance evaluation, programming, planning, and budgeting activities, as well as legislative and administrative policy development.

Findings

A number of critical issues have been identified as having a substantial impact on traffic data collection, processing, storage and utilization at ADOT. The main issues fall into one or more of the following areas:

- Coordination of collection efforts;
- Collection procedures, standards, and data documentation;
- Data quality and validity; and
- Data access and availability

Coordination of Collection Efforts

Frequently, data generated by specific data collection efforts are not published or disseminated to all possible users. This condition leads to a duplication of traffic data collection efforts. Also, these efforts do not seem to be coordinated, which also contributes to the potential for redundant data collection and processing efforts. One important step to promote the awareness of available traffic data is to develop and maintain and inventory of all traffic data collection efforts to serve as a master catalog of traffic data resources.

Collection Procedures, Standards and Documentation

Many traffic data users would like to have information available describing the methods used to collect and process the data and the conditions under which the collection was performed. Standards, documentation, and coordination will promote an awareness of available data and help users determine appropriate uses of particular data.

Lacking such standards and procedures, people may tend to recollect data to suit their needs, which results in some duplication of effort, and data may be unintentionally employed for analysis or other uses for which it was not intended or well suited.

Standards are needed, but alone are not enough to ensure valid and accurate data. To provide timely data of sufficient accuracy ADOT must ensure that appropriate traffic collection equipment is available, continuously maintained in good working order, and calibrated to provide accurate results.

Data Quality and Validity.

Users of the traffic data require complete and accurate raw data representing typical conditions on facilities of interest. Equipment failures or malfunctions can cause erroneous data values that are not always screened and removed for the data product provided to the end user. In addition to these errors, data can be recorded during collection activities that are impacted by accidents, weather, special events, construction activities, etc.

When reflected in data products, such errors cause skepticism among users. If a user doesn't trust data that is provided, he or she may be tempted to perform additional, redundant data collection at additional cost. Errors due to equipment failures will continue as a problem until additional staff and financial resources are available to support adequate maintenance.

Data Access and Availability

Many ADOT groups use small-scale database programs, such as MS ACCESS, and spreadsheets for traffic data storage and analysis. These solutions are affordable, easy-to learn, and reliable, but do not provide an integrated solution nor support widespread access to the data in its current format.

It has been noted at ADOT and elsewhere that managers and executive officials are not always aware of the data available to them to support the decision-making process, communicate real conditions and trends, and justify requests for funding. In general, most needed data exists somewhere within the agency, but accessibility to this data is severely limited. Therefore, data are not as widely used as is possible.

Recommendations

The main issues discussed in the previous section were identified after an extensive literature review and comprehensive interviews of stakeholders from all concerned ADOT groups and some other agencies. To address these main issues (reduce redundancy, ensure data quality, and maximize access and use of data resources) a number of actions are proposed. The main recommendations resulting from this effort are for ADOT to:

- Establish a Traffic Data Working Group;
- Adopt and Publish Traffic Data Collection, Processing and Dissemination Standards and Guidelines;
- Develop a Statewide Traffic Data Clearinghouse and Traffic Data Warehouse.

Traffic Data Working Group

Many of the problems experienced and reported by ADOT can be ameliorated by enhanced communication and coordination between and among the various Divisions, Groups and Sections that are involved in either collecting, processing, using, or distributing traffic data.

The establishment of a Working Group will facilitate communication and coordination and serve as a forum for identifying agency-wide data needs and priorities for both ongoing, continuous collection and for ad-hod collection activities to meet specific project needs. It is recommended that a Working Group made up of representative from all concerned ADOT Divisions and other agencies be convened on a regular basis to share information, identify issues and opportunities, and better coordinate collection activities to minimize redundancy and maximize the usefulness and use of all collected data.

Guidelines, Procedures, and Standards

There is an overall need to establish a common set of standards for all traffic data collection efforts for ADOT – the goal being to enhance the usefulness of data collected. Such standards and guidelines will allow the data to be more widely used in appropriate ways. Currently there are no uniform standards across ADOT for traffic counting, factoring, and adjusting raw data, or for documenting these processes and the resulting data products. Developing and encouraging standard practices in traffic data collection and processing will lead to improved consistency and facilitate the proper

use of data for multiple purposes across the agency.

Traffic Data Clearinghouse and Data Warehouse

The various traffic data collected, processed, analyzed, and reported throughout ADOT are not currently stored and maintained as an integrated resource. Traffic data are scattered throughout the organization in the form of studies, reports and other documents, and in computer systems in different formats. This makes it difficult to track and determine what traffic data has been collected and what might be available.

The development of a Traffic Data Clearinghouse and Traffic Data Warehouse will assist ADOT in inventorying and maintaining all traffic data collected on State highways. The Traffic Data Clearinghouse will store information about the existence of traffic data throughout the State highway system. The Clearinghouse, as an inventory of traffic data resources, would serve as a focal point for traffic data collectors, processors, and users. The Clearinghouse will allow users to quickly and conveniently identify and locate available traffic data resources throughout the State

The Clearinghouse should incorporate a geographic information system (GIS) so that traffic data resources are spatially referenced to allow users to query traffic data resources by geographic location. For example, a user can select an intersection from a map display to query the clearinghouse. The results of the query might include information about a recent traffic signal study which collected turning movements as well as approach volumes. The query might also include AADT occurring on the major approaches of the intersection.

The actual traffic data is not stored in the Clearinghouse. This more resource intensive role will be served by a data warehouse. The Data Warehouse will serve to bring together data from a variety of system and formats, and provide a consistent and optimized interface for accessing large amounts of traffic-related data. The Data Warehouse combines various data from databases across ADOT. This collection of a wide variety of data is used to provide a single point of access to large amounts of data. The system is optimized to support efficient and flexible querying and reporting for the purposes of decision support.

The Data Warehouse includes processes and systems to extract various data from their sources, transform and validate the data, and load the data into the database structure. Tools are provided so that users may browse and identify data pertinent to their function and then query and report the data in a variety of ways. If linked to a geographic information system, the query results can also be mapped and analyzed in a spatial context.

Conclusion

The establishment of a Traffic Data Working Group, adoption of procedures and guidelines for data collection and documentation, and the development of the Traffic Data Clearinghouse will make possible the implementation of a Traffic Data Warehouse to store and process the various data from across the state in a consistent, well documented manner and will provide needed access to this important resource to users throughout ADOT, local jurisdictions, private businesses, and the communities they all serve.